

REMARKS

Applicant would like to thank the Examiner for agreeing to meet with us on January 27, 2005. During this interview, Applicant indicated that they would be amending claim 50 to include the oxygen amount in the feed gas of claim 66. As indicated in the previous section, these amendments have been made to the claims. Additionally, claim 80 has been amended to include an oxygen source which supplies oxygen in the form of substantially pure oxygen to the slurry. Applicant has asserted that supplying a feed gas which contains in excess of 85% oxygen by volume, to the slurry has several advantageous results. In order to justify the increased expense associated with a feed gas containing in excess of 85% oxygen, a high utilisation of >60% is preferred (see paragraph [059]). By increasing the amount of oxygen in the feed gas, yet maintaining the dissolved oxygen concentration in the slurry, the oxygen utilization is significantly higher. Table 2 shows the difference in oxygen utilisation when using the claimed invention. Although the dissolved oxygen concentration is the same in Plant A and Plant B, the oxygen utilisation is dramatically increased resulting in a specific sulphide oxidation duty of the reactor which is increased by almost threefold. Additionally, having a feed gas containing in excess of 85% oxygen increases the mass transfer coefficient. As indicated in paragraph [104], the oxygen mass transfer coefficient is increased by a factor of 2.69 when the bioreactor is operated at a high temperature and with a high oxygen content in the inlet gas. This is an unexpected improvement in the mass transfer coefficient due to a temperature increase alone, which would be expected to increase the value of the mass transfer coefficient by a factor of 1.59. Since bioleaching depends on the absorption of oxygen, this unexpected increase in the rate of mass transfer would increase the bioleaching reaction beyond the expected amount. Applicant has discovered that by using a feed gas containing 85% oxygen by volume, the rate of mass transfer and the oxygen utilisation is unexpectedly and significantly increases, while at the same time maintaining the dissolved oxygen concentration in the slurry. It is important to maintain the dissolved oxygen concentration in the slurry to maintain microorganism growth. If

the dissolved oxygen concentration is too high, then microorganism growth is inhibited. After considering these arguments during the interview, the Examiner agreed that the amendments to the claims would place the application in condition for allowance.

Claim 50, 66-69, 71-73, 80 and 81 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Emmett, Jr. et al (US 5,007,620) in view of Applicant's admission of prior art and Epstein et al (US 4,680,267). Applicant submits for the reasons expressed during the interview with the Examiner that this rejection is overcome. Claim 50 has been amended to include the limitation of claim 66, which provides that the feed gas in step (b) contains in excess of 85% oxygen by volume. As indicated above, Applicant has discovered that by using a feed gas containing 85% oxygen by volume, the rate of mass transfer and the oxygen utilisation is unexpectedly and significantly increases, while at the same time maintaining the dissolved oxygen concentration in the slurry (see paragraph [104] and Table 2). The Examiner had indicated that it would be expected that a higher amount of oxygen in the feed gas would lead to a high dissolved oxygen amount and thus a faster reaction. As we have previously indicated and claimed, the amount of dissolved oxygen must be controlled in order to maintain microorganism growth. Merely increasing the amount of oxygen to increase the amount of dissolved oxygen would not increase the reaction rate due to the fact that the microorganism growth would be inhibited. However, Applicant has unexpectedly discovered that increasing the amount of oxygen in the feed gas in excess of 85% oxygen by volume, while maintaining the dissolved oxygen concentration, increases the mass transfer coefficient of the oxygen and increases oxygen utilisation which enhances the rate of bioleaching. As shown in Table 3 and 4, the bioleaching is enhanced by a factor of up to 1.5 to 2 by feeding substantially pure oxygen to the slurry under controlled conditions (see paragraph [125]). Because claim 67-69 and 71-73 depend from the

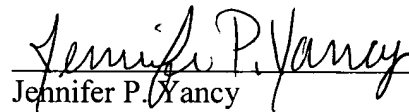
currently amended claim, Applicant submits that the rejection of these claims is likewise overcome. Applicant has amended claim 80 to include an oxygen source which supplies oxygen in the form of substantially pure oxygen to the slurry. Paragraph [059] defined pure oxygen as being greater than 85% oxygen by volume. For the same reasons as indicated previously, Applicant asserts that the rejection to this claim is overcome. Since claim 81 depends on amended claim 80, Applicant submits that the rejection of this claim is likewise overcome.

Claim 51-65 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Emmett, Jr. et al. (US 5,007,620) in view of Applicant's admission of prior art and Eppstein et al (US 4,680,267) as applied to claims 50, 66-69, 71-73, 80 and 81 above, and further in view of Steemson et al (WO 94/28184). Since claims 51-65 depend on amended claim 50, Applicant asserts that the rejection of these claims is overcome for the reasons stated above.

Claims 70 and 74-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emmett, Jr. et al (U.S. 5,007,620) in view of Applicant's admission of prior art and Eppstein et al (US 4,680,267) as applied to claims 50, 66-69, 71-73, 80 and 81 above, and further in view of Hutchins et al (US 4,729,788). Since claims 70 and 74-79 depend on amended claim 50, Applicant asserts that the rejection of these claims is overcome for the reasons stated above.

In view of the foregoing, Applicant respectfully submits that the art rejections are overcome by the amendment to claim 50 including the limitation of supplying a feed gas which contains in excess of 85% oxygen by volume, to the slurry and that the application is now in condition for allowance. Accordingly, favorable reconsideration and allowance of the application is respectfully requested.

Respectfully submitted,


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February 2, 2005

Attorney Docket No. P.19477/MAJR